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NASHVILLE, TN 37203

EXAMINER

DANIELS, MATTHEW J

ART UNIT PAPER NUMBER

1732

DATE MAILED: 10/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/720,841

Applicant(s)

HUANG ET AL.

Examiner

Matthew J. Daniels

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 13-18 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-12 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. In the reply filed 7 August 2006, Claims 1 and 19 were amended. There are no new claims and no cancelled claims.

Terminal Disclaimer/Double Patenting

2. The terminal disclaimers filed on 7 August 2006 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of USPN 6699427, USPN 6878331, or copending application 10/720833, have been reviewed and are accepted. The terminal disclaimer has been recorded. The nonstatutory double patenting rejections are withdrawn.
3. USPN 6803108 and applications 10/832,098 and 11/115,551 were also considered previously for nonstatutory obviousness-type double patenting.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claims 1-12 and 19** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no disclosure of a “thermoplastic” friction additive. Applicant appears to disclose only the friction additives recited in the claims (see, for example, Claims 2 and 3), namely oxides or carbides.

5. **Claims 1-12 and 19** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1 and 19 recited “thermoplastic friction additives”, however, the claimed thermoplastic friction additives recited by Claims 2, 3, 4, and line 5 of Claim 19 are not thermoplastics. These substances include carbides, oxides, and coke, but no substances which can be considered thermoplastics.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this

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subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. **Claims 1, 2, 6-12 and 19** are rejected under 35 U.S.C. 102(e) as being anticipated by Huang (USPN 6699427).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention “by another,” or by an appropriate showing under 37 CFR 1.131.

Applicant has pointed out that the assignment of the application and the Huang patent is currently the same, and the Huang patent lists the three inventors of the instant application. Applicant is directed to MPEP 2136.04, which states “‘Another’ means other than applicants, *In re Land*, 368 F.2d 866, 151 USPQ 621 (CCPA 1966), in other words, a different inventive entity. The inventive entity is different if not all inventors are the same. The fact that the application and reference have one or more inventors in common is immaterial.” Additionally, please note MPEP 706.02(b) which describes the ways in which a rejection under 35 USC 102(e) may be overcome.

As to Claim 1, Huang teaches a method of forming a composite material comprising: combining carbon-containing fibers (4:55-60), a carbonizable matrix material (5:46-6:15), and a friction additive to form a mixture (4:60-68);

heating the mixture to a sufficient temperature to melt a portion of the matrix material (Claim 1, column 11), the step of heating including:

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applying an electric current to the mixture to generate heat within the mixture (Claim 1, column 11); and

while heating the mixture, applying a pressure of at least 35 kg/cm² to the mixture to form a compressed composite material (Claim 1, column 11).

As to Claim 2, graphitized carbon (4:65) is interpreted to be isotropic coke.

As to Claim 6, See Huang's Claim 19, column 12.

As to Claim 7, See Huang's Claim 2, column 11.

As to Claim 8, See Huang's Claim 4, column 11.

As to Claim 9, See Huang's Claim 8, column 12.

As to Claim 10, See Huang's Claim 9, column 12

As to Claim 11, See graphitized carbon (4:65), and Claim 13, column 12

As to Claim 12, See Claim 19, column 12

As to Claim 19, See Claim 22 and graphitized carbon (4:65), which is interpreted to be isotropic coke.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 2, 3, 4, and 19** are rejected under 35 U.S.C. 103(a) as being obvious over Huang (USPN 6699427), in view of Kalnins (USPN 4252513).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention “by another”; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Huang teaches the subject matter of Claim 1 above under 35 USC 102(e). **As to Claims 2, 3, and 4**, Kalnins also teaches that silica powder, among other substances which comprise either isotropic coke or an oxide of silicon listed in (4:35-5:10), are “commonly used friction modifiers” (4:47). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Kalnins into that of Huang in order to modify the friction characteristics or increase the stopping power or lifetime of the brake (Kalnins 2:55-56). **As to Claim 19**, in the event that graphitized carbon cannot be considered to be isotropic coke (See the rejection of Claim 19 above under 35 USC 102(e)), the Examiner submits that friction additives including at least one of an oxide would have been prima facie

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obvious at the time of the invention. Huang teaches substantially all of the subject matter of instant Claim 19 in Claim 22 of the '427 patent (columns 12-14), and Kalnins additionally teaches that silica powder, among other substances which comprise either isotropic coke or an oxide of silicon listed in (4:35-5:10), are "commonly used friction modifiers" (4:47). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Kalnins into that of Huang in order to modify the friction characteristics or increase the stopping power or lifetime of the brake (Kalnins 2:55-56).

8. **Claims 1-4 and 11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kalnins (USPN 4252513) in view of Sohda (USPN 5523035). As to Claim 1, Kalnins teaches a method of forming a composite material comprising:

combining carbon-containing fibers (5:5), a carbonizable matrix material (4:55-60), and a friction additive to form a mixture (4:48);

heating the mixture to a sufficient temperature to mold a portion of the matrix material (2:20-24, 3:15-20), the step of heating including:

applying an electric current to the mixture to generate heat within the mixture (3:60-4:3, column 2); and

while heating the mixture, applying a pressure of at least 35 kg/cm² to the mixture to form a compressed composite material (2:48-52, the claimed pressure is approximately 500 psi).

Kalnins appears to be silent to (a) a pitch matrix material and thermoplastic friction additive, and (b) heating the mixture to "melt" at least a portion of the matrix material.

However, these aspects would have been prima facie obvious for the following reasons:

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(a) Sodha clearly teaches a pitch matrix (2:10-17) and pitch carbon fibers (2:58-62), the pitch fibers acting as a friction additive and having the characteristics of a thermoplastic.

(b) the heating of Kalnins facilitates “flow” of the material into cavities (2:42), it is submitted that melting of the matrix resin would have been obvious or inherent.

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Sodha into that of Kalnins because Sodha clearly directs the material for use as brakes (1:21), and Kalnins clearly desires a composition suitable for brakes (2:56). **As to Claims 2-4**, Kalnins teaches at least silica (4:45-48). **As to Claim 11**, Kalnins teaches 20-77 wt.% carbon-containing fibers with 20-50wt.% carbonizable matrix material, and 3-30% of the additive (4:35-5:5).

9. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over Kalnins (USPN 4252513) in view of Sodha (USPN 5523035), and further in view of Shaver (USPN 4444894) and Ho (USPN 5037626). Kalnins and Sodha teach the subject matter of Claim 2 above under 35 USC 103(a). **As to Claim 5**, Kalnins is silent to converting the disclosed oxide (silica) to a carbide by heat treating the compressed composite material at an elevated sufficient temperature. However, Kalnins teaches mixing of a phenolic resin with silica (4:58 and 4:48), which Shaver also teaches (1:55-67). Ho provides motivation for one of ordinary skill in the art to make the combination because silicon carbide is a high strength material having good chemical stability, excellent oxidation resistance, and because the mixture of a carbonizable matrix and silica (2:10-28) can induce a reaction which produces a relatively large proportion of silicon carbide

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whiskers (2:24-28), which are a much more effective reinforcement in composites than particulates (1:18-20).

10. **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over Kalnins (USPN 4252513) in view of Sodha (USPN 5523035), and further in view of Shaver (USPN 4444894) and Ho (USPN 5037626), and Niwa (USPN 5525558). Kalnins, Sodha, Shaver, and Ho teach the subject matter of Claim 5 above under 35 USC 103(a). **As to Claim 6**, the cited references appear to be silent to impregnating the compressed composite with a carbonizable material. However, Niwa teaches impregnating after forming the composite by introducing a resin or pitch into the pores (8:57-9:24). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Niwa into that of Kalnins, Shaver, and Ho because Niwa teaches that in order to improve the wear resistance, the impregnating (densifying) treatment is repeated such that the final porosity is preferably not more than 10% (9:17-24), which Niwa appears to achieve (13:48)

11. **Claims 7 and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kalnins (USPN 4252513) in view of Sodha (USPN 5523035), and further in view of Hatch (USPN 4166145). Kalnins and Sodha teach the subject matter of Claim 1 above under 35 USC 103(a). **As to Claim 7**, Kalnins is silent to the claimed conditions and achieved result. However, Hatch teaches that it is known to heat a mixture to a temperature of at least 500 C (2:45-3:14) to form a compressed composite having a density of at least 1.3 grams per cubic centimeter (Column 12, Table 1). Hatch appears to be silent to the claimed thirty minutes. However, Hatch clearly

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teaches that temperature ramp and time clearly represent result effective variables (5:16-19, 6:12-17, 6:23-37). In view of Hatch's teachings, and in view of Kalnins' teaching that the internal heating method produces the benefits of uniform heating (1:33-34) and reduced the time scale (1:58-60), one of ordinary skill would have found it prima facie obvious to optimize the heating time. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Hatch into that of Kalnins because Kalnins suggests brakes (2:56), which Hatch provides (1:20), Kalnins suggests phenolic resins (4:55-60), which Hatch provides (4:37), and because doing so would produce a dense composite having desirable properties including high temperature oxidation resistance (1:15-17). **As to Claim 10**, Hatch provides a two-step heating process, which comprises a first heating step at a first temperature (5:51-6:22), and a second heating step at a second temperature higher than the first (5:51-7:44). In the combined method incorporating the method of Kalnins, it would have been prima facie obvious to one of ordinary skill in the art that a second and higher power level would have been required in order to raise the temperature of the mixture to the degree required by Hatch's method.

12. **Claims 8 and 9** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kalnins (USPN 4252513) in view of Sodha (USPN 5523035), and further in view of Klett (USPN 5744075). Kalnins and Sodha teach the subject matter of Claim 1 above under 35 USC 103(a). **As to Claims 8 and 9**, Kalnins is silent to powdered pitch and polyacrylonitrile carbon fibers. However, Klett teaches both powdered pitch (4:59-65) and polyacrylonitrile carbon fibers (4:59-65). It would have been prima facie obvious to one of ordinary skill in the art at the time of the

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invention to incorporate the method of Klett into Kalnins because Klett provides a composition for brakes (2:5), which Kalnins suggests (2:56) and because Klett's method provides enhanced thermal conductivity and improved friction and wear properties (3:61-65).

13. **Claim 12** is rejected under 35 U.S.C. 103(a) as being unpatentable over Kalnins (USPN 4252513) in view of Sohda (USPN 5523035), and further in view of Prevorsek (USPN 5556704). Kalnins and Sohda teach the subject matter of Claim 1 above under 35 USC 103(a). **As to Claim 12**, Kalnins appears to be silent to increasing the density by introducing a carbonizable material into voids in the compressed composite and then backing to achieve a density of at least 1.6 grams per cubic centimeter. However, reimpregnation is common in the art, and Prevorsek teaches this aspect (4:5-13). Without re-impregnation, Prevorsek teaches that it is possible to densify composites to produce a density of 2.0 grams per cubic centimeter (1:45-49). Therefore, when re-impregnating (4:5-13), it appears obvious that one of ordinary skill would have expected to achieve densities greater than the claimed 1.6 grams per cubic centimeter. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Prevorsek into that of Kalnins in order to minimize cracking (2:30-35), increase the density of the resulting product, and improve the oxidation resistance.

14. **Claim 19** is rejected under 35 U.S.C. 103(a) as being unpatentable over Hatch (USPN 4166145) in view of Kalnins (USPN 4252513) and Sodha (USPN 5523035). **As to Claim 19**,

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Hatch teaches a method of forming a composite material suitable for vehicle brakes comprising the steps of:

- a) compressing a mixture of carbon fibers (4:27-29), a matrix material which includes pitch (4:34-38), and a friction additive (4:30-31),
- b) during the step of compressing, the mixture reaches a temperature of at least 500 degrees C to form a compressed preform (3:10-22, 5:51-68);
- c) introducing a carbonizable material into the compressed preform to form an impregnated preform (1:54-56);
- d) optionally, baking the product of step c) to carbonize the carbonizable material (1:54-56);
- e) optionally repeating step c) and step d) (1:54-56); and
- f) graphitizing the impregnated preform to a final temperature of at least about 1500 degrees C to form the composite material (columns 6 and 7), the graphitized preform having a density of at least about 1.7 grams per cubic centimeter if step c) is repeated no more than once (See "Final Density" in Table II, Column 13).

Hatch is silent to the following aspects of the Applicant's invention:

- a) the additive comprises at least one of a carbide, an oxide, isotropic coke, and combinations thereof;
- b) the additive is a thermoplastic
- c) applying a current to the mixture, the mixture providing a sufficient electrical resistance to the current such that the mixture reaches the claimed elevated temperature.

However, these aspects would have been prima facie obvious over Kalnins for the following reasons:

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- a) Firstly, Hatch teaches asbestos (4:31), which is a silicate, and therefore comprises at least an oxide. However, Kalnins teaches silica, or silicon oxide, as a commonly used friction modifier (4:45-48).
- b) Sodha teaches a pitch carbon fiber, the pitch fibers acting as a friction additive and having the characteristics of a thermoplastic.
- c) Thirdly, Kalnins teaches passing an electric current through the mixture (1:47-3:19) to reach temperatures of 500 C (2:41).

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the methods of Kalnins and Sodha into that of Hatch because (a) Kalnins resolves the problem of nonuniform heating of the resin due to poor heat conducting characteristics (Kalnins, 1:25-30) and reduces the time scale for heating (Kalnins, 1:58-60), and (b) because Hatch clearly suggests carbon fibers and because pitch based carbon fiber would enhance the oxidation resistance.

Response to Arguments

15. Applicant's arguments filed 7 August 2006 have been fully considered but they are not persuasive. The arguments appear to be on the following grounds:

- a) Huang is not proper prior art.
- b) There is no teaching of the subject matter of instant Claim 1, which includes a thermoplastic friction additive. (page 12)

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c) Amended Claim 19 requires, among other features, “a thermoplastic friction additive, wherein said additive comprises at least one of a carbide, an oxide, isotropic coke, and combinations thereof.” (page 19, middle)

16. These arguments are not persuasive for the following reasons:

a) Applicant has pointed out that the assignment of the application and the Huang patent is currently the same, and the Huang patent lists the three inventors of the instant application. Applicant is directed to MPEP 2136.04, which states “‘Another’ means other than applicants, *In re Land*, 368 F.2d 866, 151 USPQ 621 (CCPA 1966), in other words, a different inventive entity. The inventive entity is different if not all inventors are the same. The fact that the application and reference have one or more inventors in common is immaterial.” Additionally, please note MPEP 706.02(b) which describes the ways in which a rejection under 35 USC 102(e) may be overcome. Applicant’s remarks alone have not overcome this rejection.

b and c) Applicant’s remarks appear to assert that the rejection is now deficient because it does not include thermoplastic friction additives such as carbides, oxides, coke, or combinations thereof. The Examiner points out firstly that a text search of the application revealed only one instance of the word “thermoplastic” which pertained to the matrix and not the additive, and no other thermoplastic additives were found. Thus, a new matter rejection is made. Secondly, the Examiner points out that the additives claimed, such as those listed in Claim 3, are in no way thermoplastic. This amendment renders all considered claims indefinite. However, a new rejection is also set forth above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Daniels whose telephone number is (571) 272-2450. The examiner can normally be reached on Monday - Friday, 8:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MJD 10/14/06



CHRISTINA JOHNSON
PRIMARY EXAMINER

10/16/06